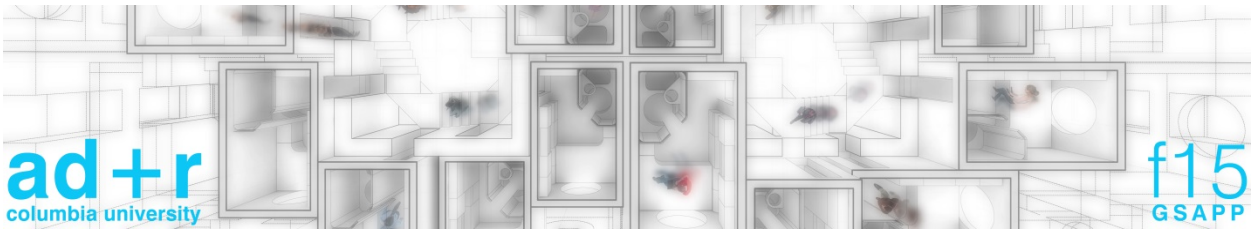


Architectural Drawing + Representation I

Instructors:
Josh Uhl (jdu1@columbia.edu), Danil Nagy (dn2116@columbia.edu), Farzin Lotfi-Jam (farzin.lotfijam@gmail.com), Bika Rebek (alibis@gmail.com)

> *"Drawing, whether done by hand or using sophisticated computer software, can be either descriptive or prescriptive. If descriptive drawings can be subjective (impressionist, expressionist, and so forth) or objective ("technical" or "analytical"), prescriptive drawings are intended to be operative; they are manifestos of sorts. They are devices for thinking as well as for presenting positions."*
>
> *- Bernard Tschumi, Operative Drawing, The Activist Drawing*

Architects do not make buildings; we make drawings. Our drawings can be descriptive when they are generated to convey a particular set of formal conditions, and they can be prescriptive when they act as tools used to interrogate adjacencies and spatial relationships. In either case, a well-crafted drawing becomes a feedback loop for the architect, allowing one to interrogate their design, respond to the drawing, and further their proposal.

Architecture's history of projection-based representation developed a certain level of stasis in its evolution over the last half a century. However, recent shifts to a 'paperless' architecture continue to have a profound impact on the field of architecture and its modes of representation and analysis. Beyond severing the longstanding relationship of the line to paper, the extraction of the vector to a virtual realm is accompanied by a simultaneous influx of data. Tools like *Building Information Modeling* and other parametric based modes of practice have saturated our methods of representation with a significant amount of information.

With this new data saturation the position of the architectural drawing is in flux. The field of architecture is slowly moving away from its longstanding roots of projection based representation and drawing, in favor of a virtual model. The embedded data within the virtual model anticipates a certain adaptability or temporal quality which stands at odds with the fixity of traditional techniques. In this context, our historical techniques of communication have become an afterthought rather than the primary vehicles of spatial interrogation and communication. While longstanding methods such as plan, section, and elevation have remained, they have assumed a compromised, almost secondary, position. New tools of architectural investigation have made spatial inquiry so fluid and ubiquitous, that much of the field's representation has gone the way of fast food; quickly made, and lacking much nutritional value. Understanding this shift might lead a critic towards a nostalgic longing for the historical modes of representation. Instead, we propose to investigate the alternate scenario.

In this course, we will engage drawing's new temporal nature and try to harness its potential. What does it mean to make a drawing in the 'Post-Projection' era? What is lost when an understanding of the constructed nature of a drawing is gone and the tools of projection are relegated to a secondary role? What can be gained through understanding these tools more completely and then re-appropriating them in contemporary investigations?

Architectural Drawing + Representation will investigate the current concepts, techniques, and working methods of computer aided 'drawings' in architecture. The focus of the course will be the *construction* of architectural representations. However, rather than just experimenting in technique, the course will encourage one to define how these new operative techniques are changing the role of drawing in architecture. To this end, we will study the operative relationship between 2d and 3d data, exploring the reaches of their analytic and representational potential. While the class is a foundational course in architectural computing, it will build on the student's advanced ability to question, shape, and interrogate space and time. In doing so, the goal will be to reassert the speculative nature of representation in the creation of conceptual, provocative, and data-filled drawings.

The full-semester course will be focused on a project that is generated primarily with the use of Rhinoceros and 3dsMax. After the initial development of a virtual model, we will investigate tools to further the analytic and representational capacity of the data within the model. Studies will be in the form of drawings, physical models, images, and animations. There will be one assignment with 4 milestones. Each of these milestones will be posted on the class web page for grading.

As a companion to the course lectures on Thursday nights, the class will have weekly Tutorial Sessions and weekly Seminars.

Tutorials are two hour 'hands-on' sessions led by a video tutorial with one-on-one assistance by the course TAs. The tutorials will cover the concepts and techniques covered in the course lectures. However, the specific content of the tutorial assignments will only be covered during the tutorial sessions. Tutorial times will be coordinated with your class TA and will start the second week of classes.

Seminars are weekly two hour sessions organized by your assigned course instructor. Seminars will be comprised of desk crits or pinups in response to the specific needs of the class as deemed by the individual instructors. 'Office Hours' will occur as follows for each instructor:

Uhl – Wednesdays, Location TBD, 9-11am
Nagy – Wednesdays, Location TBD, 9-11am
Jam – Wednesdays, Location TBD, 9-11am
Rebek – Tuesdays, Location TBD, 7-9pm

For the course assignment, each student will choose a building from the provided list. Alternate buildings are discouraged, but will be considered on a case by case basis and determined by the compelling nature of your argument. Each of the assignments will be reviewed in either desk crits or pin up and posted on the class web page for grading.

Grades will be based on the following criteria:

10% Assignment 1A – Research Assignment
25% Assignment 1B – Drawings
25% Assignment 1C – Fabrication/Model
30% Assignment 1D – Animation/Drawings
10% Attendance and Participation

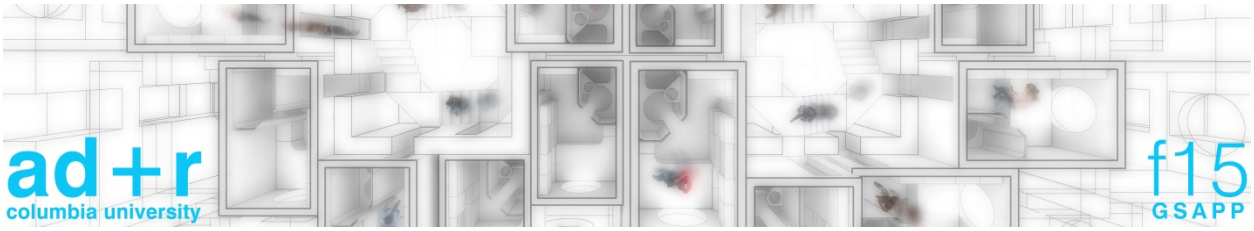
Requirements for the course:

-Attendance at the lectures, tutorials, seminars, pinups and desk crits
-Completion of the four assignments, includes the online posting and course pinups/review.

Recommended Reading:

There are no required textbooks for the course. There are recommended readings as a companion to the course lectures and discussion. The readings are excerpts from the books below. The recommended excerpt will be posted on the university's ***Courseworks*** site. We have also listed below a few books, which are recommended if you have not interacted with them in your education.

The Activist Drawing: Retracing Situationist Architectures from Constant's New Babylon to Beyond, Catherine de Zegher and Mark Wigley, editors
Architectural Geometry, by Helmut Pottmann, Andreas Asperl, Michael Hofer, Axel Kilian
Architecture: Action and Plan, Peter Cook
The Changing of the Avant-Garde: Visionary Architectural Drawingss from the Howard Gilman Collection, Contributions by Terence Riley, Sarah Deyong, Marco De Michelis, Pierre Apraxine, Paola Antonelli, Tina di Carlo, Bevin Cline
Contested Symmetries and Other Predicaments in Architecture, Preston Scott Cohen
Data Flow: Visualizing Information in Graphic Design, Robert Klanten, editor
Diamond Catalogue, Essay by John Hejduk
Drawing: the Motive Force of Architecture, Peter Cook
Elements of Descriptive Geometry, George Warren, George Blessing, and Lewis Darling
Envisioning Architecture: Drawings from the Museum of Modern Art, by Matilda McQuaid
Envisioning Information, Edward R. Tufte
Mappings, edited by Denis Cosgrove (James Corner's essay, *Agency of Mapping*)
Pamphlet Architecture 1-10, Princeton Architectural Press
Perfect Acts of Architecture, Jeffrey Kipnis
Points + Lines: Diagrams and Projects for the City, Stan Allen
Practice: Architecture, Technique and Representation, Stan Allen
The Projective Cast: Architecture and Its Three Geometries, Robin Evans
Scripting Cultures, Mark Burry
Translations From Drawing to Building, Robin Evans
Visual Explanations, Edward R. Tufte



Architectural Drawing + Representation I

Assignment(s)

Instructors: Joshua Uhl, Danil Nagy, Farzin Lotfi-Jam, and Bika Rebek

> *"The second meaning of the word 'drawing' - to pull - points to this essential meaning of the drawing as a means of pulling out, revealing and concretizing internal mental images and feelings as much as recording an external world."*
>
> *- Juhani Pallasmaa, The Thinking Hand*

Assignment 1 – The Architectural Detail

Drawing and representation has always taken on a multitude of roles within architecture, from technical description and representation to radical proposals and flights of the imagination. In recent decades, the role of architectural drawing has been further confounded by the appearance of new digital tools, which have downplayed the utility of two dimensional drawing in favor of three dimensional and time-based representations. While these tools have allowed radical new possibilities for representation, they have also effectively divorced our bodies and sense of touch from the process of design, making it a wholly visual process. The goal of the class will be to critically investigate the continuing role of representation within architecture, exploring both its traditional uses in light of new tools, and how these tools can lead to radically new methods of design and exploration.

For this assignment, each student will select a building from the provided list of buildings and projects. An initial analysis will include research of plans, sections, and detail drawings of the building in order to understand it as a system linking ideas of form, function, and structure, and transcending various scales from the detail to its context within the city. Each student will then select a specific detail within the building for further exploration.

Within the study of an architectural detail, one will often find the genetic make-up of its larger context. Isolation and abstraction of the minute allows one to re-evaluate the larger whole and understand it in a new way. In most cases, the context of the detail will be critical for the analysis. Therefore, the entirety or a majority of the building will need to be modeled through the course of the semester in order to complete the assignment. Students are encouraged to be creative regarding the definition of a detail, as well as the meaning and value of the images they produce.

The assignment will consist of four parts, each asking the student to study their chosen building and detail using a specific form of representation. The act of sketching will serve as a unifying base and strategy for the course. Along with the assignments, students will be asked to submit sketches that show the development of their concepts and the intention behind their finished work.

Assignment 1a: Research

Due September 16th, posted to the class website

The first assignment will familiarize you with your building, help you focus on the detail you want to investigate, and allow you to start exploring different forms of representation. Specific requirements of the first assignment are:

- Three (3) original sketches that study your project at the scale of the detail, the building, and its context.
- Two (2) 11x17 tiled boards with scanned plans, sections, elevations, detail sections and perspective imagery of your building.
- Use original documents as much as possible, using the Avery Library as your main resource.

Assignment 1b: Projection

Due October 21st, posted to the class website

The second assignment focuses on creating two dimensional representations of the building detail. Using your knowledge of projection along with techniques of composite drawing, rendering, and vector export, you will create both an immersive perspective section and exploded axonometric diagram. Emphasis should be placed on developing smart drawings that reveal the concept of the building and trajectory of the analysis, with composition and drawing clarity carefully considered.

At this milestone, your digital model should be near completion, developed enough to be mined for vectors and pixels in the pursuit of extraordinary analysis drawings. The images produced should convey the system under study as an isolated variable, as well as how that system relates to the rest of the building. Specific requirement of the second assignment are:

- At least one sketch for each drawing showing how the concept of the drawing was developed and the information you intended to show
- One (1) 2500 x 1875 pixel, annotated exploded axonometric analysis diagram using proper line weight, type, and color to show the structure and interrelationship of the detail's geometry
- One (1) 2500 x 1875 pixel immersive sectional perspective using rendering techniques to show spatial characteristics through careful use of light and shadow, color, and texture

Assignment 1c: Model

Due November 11th, images posted to the class website and models turned in at class for grading

The third assignment is to create a physical model of the building detail (or a portion of that detail) by creating a scaled assemblage with the laser cutter and/or the 3D printer. You may consider integrating both technologies or developing a model by hand with the aid of those tools. Students should consider employing transparency, unfolding, and sectioning as operative techniques in the composition of the model. Additionally, connectivity of the parts should be studied. Can you develop a system of connections which eliminates the needs for adhesives?

The model is not intended to be a direct or exact translation of your building (although this is an option if you choose). When switching scales, a different system of connectivity will inevitably need to be designed in order to accommodate this size shift. Therefore, the techniques utilized to export the virtual data for the creation of the physical model should be studied as a design problem. In the process of this abstraction, careful consideration should be given to the model's representation and the construction methods you employ.

The scale for your model should be determined in relation to the 'idea' you are trying to convey about the project you are studying. If your building has an interesting component that you'd like to study at a much larger scale, it is certainly appropriate to model an element at a larger scale (ie. light fixture, curtain wall fixture, etc.) Alternately, if you are looking at a larger system like a space frame or truss, a much smaller scale might be appropriate. The minimum requirements of the third assignment are:

- A series of sketches showing the construction concept for the model
- One (1) 12"x12"x12" scaled physical model of building detail or system
- Three (3) images of the model posted onto the class website.

Assignment 1d: Animation

Due on or around December 18th, posted to the class website and upload to school server

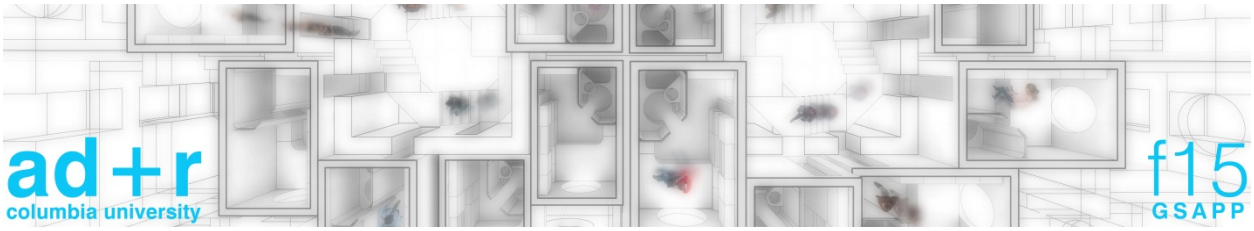
The final assignment will use time, the fourth dimension, as an opportunity to study architecture as an animate entity. The program and systems of a building often have a complex relationship to their context. These relationships are often impossible to fully understand or identify in a single instance. Concepts such as these are most effectively documented through an aggregation of imagery in order to analyze the environmental changes at play.

To study these concepts, create one (1) animated analysis movie of your detail. Techniques of abstractions such as of unfolding, sectioning, transparency, superimposition, and wide angle perspective should be employed in these studies. In addition, update your drawings from assignment 1b to add an element of time and document the discoveries you made in scripting your animation. The minimum requirements of the fourth assignment are:

- A series of sketches showing a storyboard for the final animation
- Updated versions of the two (2) 2500 x 1875 pixel images from assignment 1b
- One (1) final animation meeting the criteria covered in class

Grading for all assignments will take into account both the difficulty and the execution of the assignment, as well as timeliness of submittal. Any problems uploading or submitting work by the due date should be reported to the course instructors.

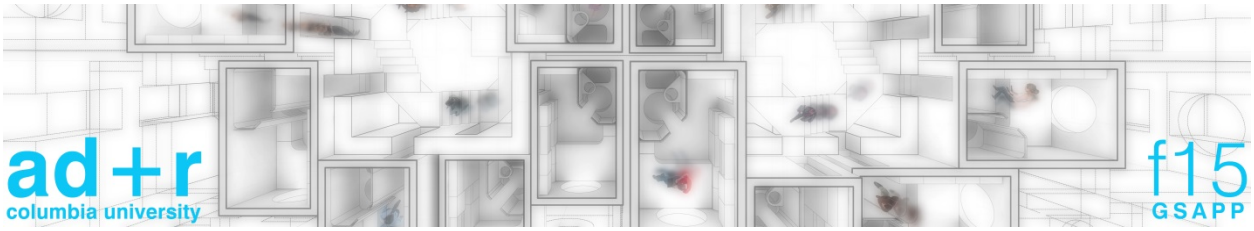
*Please note that personal projects, past and present, will not be accepted for this assignment.



Architectural Drawing + Representation I

ADR1 SCHEDULE:

Wk	Date	Lectures – Wednesdays 11am-1pm, Wood Auditorium	Tutorials
1	Sept 9	LECTURE: The Architectural Drawing + Course Introduction	Barcelona Pavilion
-	Sept 12-13	DEMONSTRATION: Digital Primer Weekend Workshop: Plans, Sections, Perspectives - Basic drawing, modeling and representation in Rhino + Adobe CS	Barcelona Pavilion
2	Sept 16	LECTURE: Pixels, Points, and Vectors: The Anatomy of a Drawing (Plans, Sections, Perspectives) ASSIGNMENT 1A DUE	Panton Chair
3	Sept 23	LECTURE: Free Form Curves and Surfaces DEMONSTRATION: Non Uniform Rational B-Splines - Rhino 2D/3D & Surfaces	TBD
4	Sept 30	DEMONSTRATION: 3dsmax: 2D/3D + Meshes and Subdivision surfaces	Barcelona Chair (Small House)
5	Oct 7	LECTURE: Arguments (Architectural Thoughts and Representation)	Box Modeling
6	Oct 14	LECTURE: A Brief History of Parametricisms DEMONSTRATION: Parametrics (Max/Grasshopper)	Parametric Bridges
7	Oct 21	MIDTERM REVIEW - ASSIGNMENT 1B DUE	
8	Oct 28	LECTURE: Fabrication and Rationalization DEMONSTRATION: Modeling and Rationalization for physical model making	Barcelona Pav. Materials
9	Nov 4	LECTURE: Color, Light, Shadow & The Observer DEMONSTRATION: Lighting, Materiality and Texture (3dsmax and Photoshop)	Barcelona Pav. Lighting
10	Nov 11	MODEL REVIEW - ASSIGNMENT 1C DUE	
11	Nov 18	LECTURE: Time and Architecture (and representation) DEMONSTRATION: Analysis and Animation (3dsmax)	Animation Tutorial
12	Nov 25	LECTURE: The Graphic Manifesto / The Story Board - Narratives in Architecture	After Effects Compositing
13	Dec 2	DEMONSTRATION: Compositing the Image (Photoshop and After Effects)	
15	TBD	FINAL REVIEW - ASSIGNMENT 1D DUE	



Selected Buildings/Projects for ADR Assignment

Building	Architect
New Museum of Contemporary Art	SANAA
The High Line	DS+R
Santa Caterina Market	Enric Miralles
Media ITC	Cloud 9
Salk Institute	Louis Kahn
Shibaura House	Sanaa
Nakagin Capsule Tower	Kisho Kurokawa
Kunsthal	OMA
Market Hall	MVRDV
Jewish Museum	Daniel Libeskind
Dutch Embassy	OMA
National Gallery	Mies van der Rohe
Coliseos	Felipe Mesa +El Equipo de Mazzanti
CCTV	OMA
Water Cube - National Aquatics Center	PTW Architects
Bird's Nest - National Stadium	Herzog & de Meuron
Casa del Fascio	Giuseppe Terragni
Villa Paladiana	Palladio
Toledo Museum of Art	SANAA
Fun Palace	Cedric Price
New Babylon	Constant
Banco de Londres	Clorindo Testa
Parc de la Villette	Bernard Tschumi
Never Never Land House	Andres Jaque
Villa Nurbs	Cloud 9
Kanagawa Institute of Technology	Junya Ishigami
San Paulo Museum of Art	Lina Bo Bardi
House&Atelier	Atelier Bow Wow
Solo House	OFFICE KGDVS
Casa da Musica	OMA
21st Century Museum	SANAA
The Walking City	Ron Herron / Archigram
Kunsthaus Graz	Peter Cook
Taiyuan Museum	Preston Scott Cohen
Shanghai Expo - Danish Pavilion	BIG
TWA Terminal	Eero Saarinen
Kagawa Prefectural Gymnasium	Kenzo Tange
Kunsthauz Bergenz	Peter Zumthor